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World Food Supply

As scientists break through the envelope of this earth and attempt to touch base on the moon or Mars, two major unsolved problems on this planet haunt many thoughtful people.

First, some two-thirds of the human race are underfed and no way has been found to provide them with an adequate diet. Second, people are multiplying faster than ever and at a rate that threatens to outrun the world's capacity to produce more food. Flight into space is not likely to solve either of these interrelated problems.

In considering the dilemma of world hunger, some people cannot look beyond the surplus food which has spilled over from the farms of this country into the bulging storage bins in increasing quantities year after year. To them the solution is simple: get the surpluses in one part of the world to the empty stomachs in another part.

This glib prescription for curing the world's hunger is merely an illusion. Assuming that the U. S. food surplus for one year (1957) were distributed, it would mean the equivalent of approximately two teacupfuls of rice every 17 days for each of the hungry 1.8 billion people.[27] This would add about 90 calories a day to the per capita diet.

Based on latest available food-supply estimates—800 million metric tons in 1956—if equitable distribution to the world's dinner tables were possible, every living person would be on short rations.

Intensive efforts should be made to increase global food production. In this age of technology, the world's bread baskets yield enormous quantities of food and can be made to yield more. Even though most of the best cropland is now in use, much new land can be brought into cultivation; but at a price—and in general the price will be high. Even as gains are made in new lands, soil erosion destroys millions of acres each year. Millions more are taken out of agricultural production for industry and expanding cities.

Other measures which show any promise of increasing the food supply should be pushed vigorously. These include more efficient harvesting of the seas, algae farming, the application of atomic and solar energy to agricultural production, more efficient land use, improved fertilization practices and increased use of fertilizers, etc.

Even if every practical expedient is used to increase food pro-

duction, the intensity of the basic problem will not lessen. Rather, the pressures on the food supply will increase in the decades ahead as a result of the unprecedented accelerating multiplication of people.

World population is now 2.8 billion. The most rapid growth ever recorded came during this decade. About 47 million people were added to world population in 1958. At current growth rates, there will be almost 3.4 billion people in only 10 years and nearly six billion by the end of the century. That could be a conservative estimate because many experts believe that growth rates will continue to accelerate for at least 20 years as public health programs reach into remote villages to trim death rates.

One year's increment of people now requires the addition of some 47 million acres of new farm land or the equivalent added production from acres already burdened; 10 years' increment means nearly half a billion acres. Because this necessarily will be mainly secondary land, production costs will soar. The limit on cropland resources of the planet could be reached well before the century ends.

Tragically, population growth will surge ahead fastest in those areas where per capita food production is lowest; where gains in production are most difficult to achieve; and where illiteracy as well as malnutrition depresses the levels of living. These are the areas where most of the world's underfed people live.

World population was about 900 million in 1798 when the Reverend Thomas Robert Malthus — that gloomy English clergyman-economist — prophesied that people would eventually reproduce themselves beyond their capacity to produce food. Malthus reasoned that the food supply increases at an arithmetical rate while population increases at a geometric rate. Now that the population base is nearly 3 billion, now that the rate of growth adds about 47 million more people each year, Malthus' warning takes on a new meaning.

The rapid population growth of this century cannot continue indefinitely. If birth rates in the population explosion areas are not reduced to balance modern low death rates, death rates will rise, ultimately and inevitably, to dress the balance.

To ignore this basic law of population dynamics or to pretend wishfully that spaceships or algae farms will bail the world out of this man-made population crisis will prolong suffering and invite catastrophe.

FOOD: MAN'S MOST BASIC NEED

Man has come a long way since his Biblical progenitors were expelled from the Garden of Eden for the misappropriation of an apple. There, food was provided in bounty and without effort. Since then, man's history has been an unending struggle for food. Only when this basic need was satisfied could he progress through the evolutionary process to higher civili-

zations. The migrations and explorations which have opened up new lands have been activated largely by the relentless search for food and sustenance.

Agriculture, as we now know it, is believed to have had its beginnings at least 7,000 years ago. According to Dr. Robert J. Braidwood and his colleague, Professor Charles A. Reed, of the Department of Anthropology at the University of Chicago:

> After an approximate half million years of relatively simple food-gathering and food-collecting existence, mankind finally achieved—with the domestication of plants and animals—a settled food-producing level of existence. Traces of the beginnings of this change-over may go back eight or ten thousand years, perhaps both in certain Old World and certain New World situations. . . . Truly efficient food-production was under way in western Asia by about seven thousand years ago, and perhaps by four thousand years ago in nuclear America.[1] *

The early civilizations arose and flourished in the agrarian areas of Egypt, the Near East, Greece, Rome, China and India. Urban communities began to increase in the West about 1600:

> Urban developments came slowly. The towns and cities of fourteenth-century England were still, in the main, agricultural communities, and even the inhabitants of London led a half-rural existence. Pestilence hit the urban communities more heavily than the more sanitary rural ones and inhibited rapid city development. By the middle of the sixteenth century London appears to have contained about 100,000 persons. But by the opening of the seventeenth century urban communities were on the increase—in spite of recurrent visits of the Black Death—and the population of London had reached about 200,000.[2]

World population was estimated to be about 550 million in 1650. It was at this time that the growth curve changed from its snail-like rate of increase which had held since the start of recorded history about 3000 B.C. and began to climb in a geometric rise which culminated in the population explosion of this century.

Food from the New World helped to improve living levels in those European countries fortunate enough to have colonies in the Americas. The improving technology, especially in England, brought more efficient use of wind, water and later of coal for power, and this opened the way for increasing food production in Europe.

Through the rapidly accelerating gains in technology, which followed the fruitful inventions of the Industrial Revolution from the late eighteenth through the nineteenth centuries, food production increased steadily. Colonial expansion of the British Empire and the other powers of western Europe brought vast tracts of virgin, fertile lands into production in the New World. The pampas of Argentina, the prairies of North America and the rangelands in Australia and New Zealand became more and more important in supplying the food needs of an expanding Europe.

By the 1930s, the world's bread baskets began to pile up the food surpluses which have become a source of vexation to statesmen

*Numbered references are to the sources listed at the end of this report.

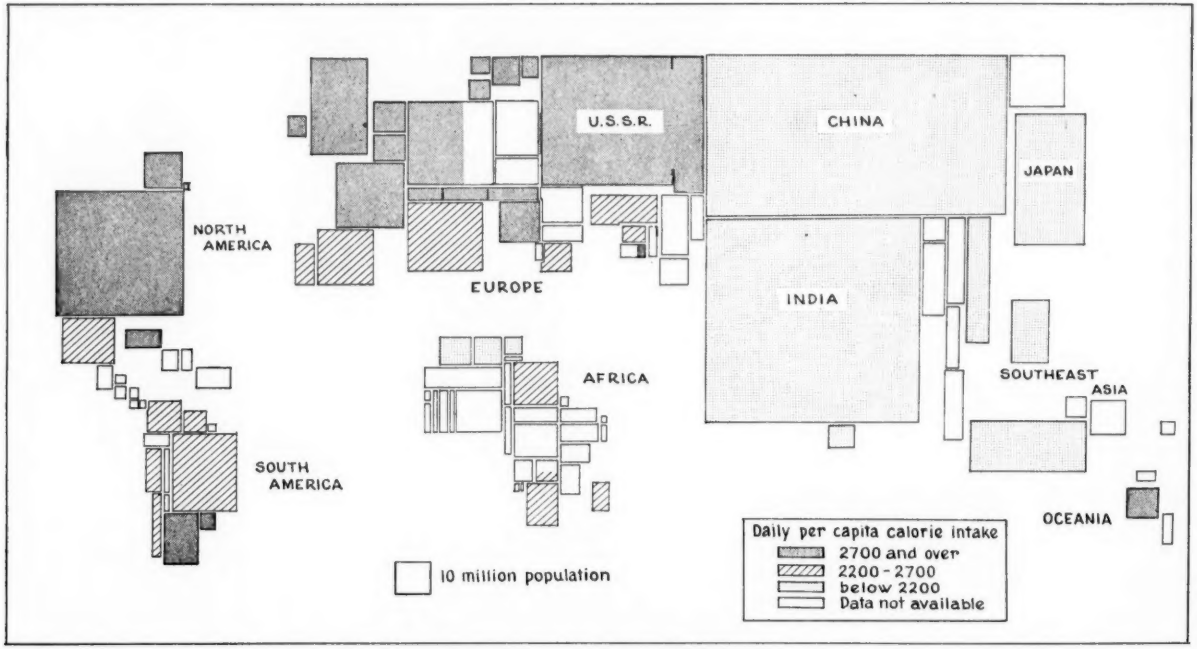

FIGURE 1: PEOPLE AND CALORIES

Continents and nations are drawn proportionately to the size of population. The cross-hatching shows various levels of caloric intake based on FAO computations in 1957. The inverse relationship between population size and caloric deficiency is striking.[18]

and of provocation and envy to the vast numbers of ill-fed peoples in the underdeveloped nations.

WORLD WAR II DISRUPTED FOOD PRODUCTION

Wars have always had their impact on food as well as on population. Food production was badly disrupted in several nations during and immediately following World War II. Just after its founding in 1945, the Food and Agriculture Organization of the United Nations (FAO) took an inventory to see exactly how the different regions and countries of the world fared in their food supplies. This may have been the first attempt to coordinate data on food and nutrition for the world as a whole. The Four Horsemen, in keeping with tradition, had done a thorough job in decimating both men and food. In its 1946 Report,[19] FAO revealed that there had been a noticeable deterioration in food production since the prewar benchmark period of 1934-1938.

Much of war-torn Europe and Asia was seriously short of needed calories, proteins, vitamins and minerals. FAO estimated that the world as a whole had fallen behind in the race to bring food production up to the rate of population growth.

Many factors had disrupted the pattern of food production. Among them, cropland became battlefields, farmers were drafted into the armies of their respective countries and farm families were uprooted from their homes.

As the curse of the second World War descended upon Asia and her teeming millions, the traditional gap between food production and population grew wider. Malnutrition, which had plagued millions of Asians for centuries, now became the common lot of most people.

It should be emphasized that average values for caloric intake do not show the entire range of dietary standards within a country. In many of the underfed countries, a very small, privileged minority enjoys an opulent diet. Most of their countrymen, however, suffer from chronic or intermittent malnutrition. Even in the food-surplus countries of the New World, many people, through ignorance or poverty, have inadequate diets. Their food may lack some of the essential vitamins and minerals, even a sufficient number of calories. Such dietary deficiencies have been reflected in parts of the United States in the occurrence of anemias and pellagra and other nutritional-deficiency diseases.

Table I shows FAO appraisals of calorie needs for a number of countries. FAO nutritional experts note that there are significant differences in the per capita calorie needs of different populations, due to such factors as climate, body build of the people and age-distribution. When some two-fifths of the population are children, as in Guatemala, the per capita needs are less than in Sweden, where three-fifths of the people are adults.

According to FAO estimates of

a decade ago, merely to keep pace with population growth at the 1946 rate of consumption, the world would need to increase animal protein production by over 8 million tons annually for the next fifty years. To take adequate care of those areas of the world's underfed people, the increase should be on the order of 50 million tons. Since then, the rate of population growth has risen, necessitating an upward revision of these estimates.

World War II, if it accomplished anything, made it abundantly clear that the world is an interacting community. No longer can any nation live to itself alone. While social and economic patterns and political ideologies differ, basic human needs do not. Barriers which once shut off the half-starving peoples of many countries from those with groaning tables no longer exist, since geographical isolation has been erased by modern communication and interchange through the United Nations and other agencies.

The problem of hunger among the poorer two-thirds of the earth's people has pricked the conscience of the world. Earnest efforts are being made to solve it. Inevitably, progress moves at a slow pace, because the factors involved are so many and so complex. In some ways, it is like the task of Sisyphos trying to roll the rock up a hill only to find it slipping backwards.

Some of the most formidable hurdles, it is pointed out, are not merely technological; they are economic, political and — it should be added — religious. Changes which are necessary to progress often run counter to age-old traditions and habits.

SOME POSTWAR PROGRESS

Despite such formidable difficulties—economic, social and political

TABLE I: CALORIC SUPPLIES MEASURED AGAINST REQUIREMENTS[21]
(Calories per person per day)

Region and country	Recent level	Estimated requirements	Difference (per cent of requirements)
Far East			
Ceylon	1,970	2,270	−13.2
India	1,700	2,250	−24.4
Japan	2,100	2,330	− 9.9
Philippines	1,960	2,230	−12.1
Middle East			
Cyprus	2,470	2,510	− 1.6
Egypt	2,290	2,390	− 4.2
Turkey	2,480	2,440	+ 1.6
Africa			
French North Africa	1,920	2,430	−20.9
Mauritius	2,230	2,410	− 7.5
Union of South Africa	2,520	2,400	+ 5.0
Latin America			
Argentina	3,190	2,600	+22.7
Brazil	2,340	2,450	− 4.5
Chile	2,360	2,640	−10.6
Mexico	2,050	2,490	−17.6
Uruguay	2,580	2,570	+ 0.4
Europe			
Denmark	3,160	2,750	+14.9
France	2,770	2,550	+ 8.6
Greece	2,510	2,390	+ 5.0
Italy	2,340	2,440	− 4.1
Norway	3,140	2,850	+10.2
United Kingdom	3,100	2,650	+16.9
Oceania and Northern America			
Australia	3,160	2,620	+20.6
United States of America	3,130	2,640	+18.5

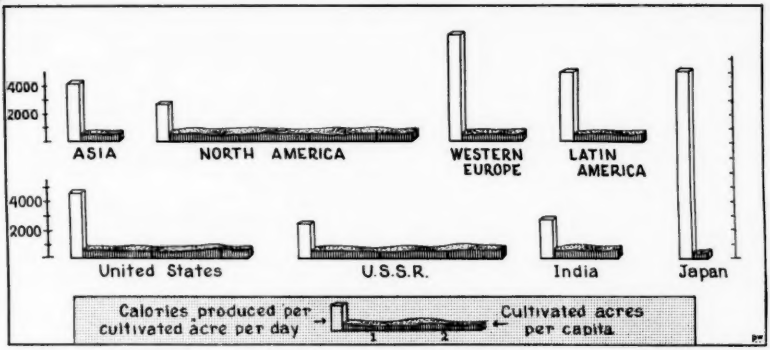

FIGURE 2: ACRES AND CALORIES

This chart shows the number of cultivated acres per capita and the calories produced per cultivated acre per day in various countries and regions. Japan stands at the top in productivity, the U.S.S.R. and North America at the bottom. If the rest of the world could raise its agricultural productivity to equal that of Japan, much more food could be produced. That this is so gives hope that a period of grace still exists during which population can be checked. Modified from Brown.[2]

—some progress has been made in the production of food and in the distribution of surplus food. The governments of several underfed countries have made notable and heroic efforts to pull themselves by their bootstraps above the starvation level. Many have been helped by technical assistance programs of FAO. The United States, through the Marshall Plan, then the Point Four Program and now the International Cooperation Administration, has provided technical and agricultural extension services, first to the war-torn areas and now to underdeveloped nations. This country has donated and sold some of its surplus farm produce when extending such assistance.

More recently, the USSR has entered the arena of technical assistance to underdeveloped countries.

Dollar shortages in many of the underdeveloped countries retarded the efforts to correct the imbalances in food distribution on a world-wide scale. Since industrial output in these countries was low or non-existent, they could not obtain Western currency in exchange for manufactured goods. The dollars or pounds they obtained from their specialty exports, such as jute, tea, rubber and coffee, were hardly enough to purchase the vast amounts of food needed to improve nutritional standards. And they had no food surpluses to barter off in order to obtain additional dollars.

Paradoxically, India had accomplished outstanding increases in food production during her First Five-Year Plan which ended in 1956, but she now faces serious food problems in the middle of her Second Five-Year Plan which concentrates on industrialization. Pop-

ulation growth has outrun food production, and recent crop failures make the threat of famine imminent. Dollar shortage further complicates India's food problem.

In the Western industrial countries, striking improvements in agricultural methods make it relatively easy to increase production, but efforts in that direction have to be restrained in the light of the mounting surpluses. There is little need for additional food since both incomes and per capita food consumption are at fairly high levels.

NUTRITIONAL LEVEL TOO LOW FOR TOO MANY

FAO surveyed the nutritional content of the food available to more than half the world's people in its 1952 Report:

> Today more than half of the people in the world do not get enough food for healthy existence. They not only get too little food but their diets consist mainly of cereals and starchy foods. The average family in many countries cannot afford foods such as meat, eggs, and milk. The most serious deficiency in their diet is a lack of good quality protein. Protein malnutrition is the greatest single source of death in children between the ages of one and five. Many adults die each year of deficiency diseases, such as beriberi; others survive but show the results of undernutrition in their stunted growth, lack of energy and low resistance to disease. In these parts of the world the average life expectancy is about thirty years.
>
> Only about one-sixth of the world is well fed. For the most part these people live in North America, much of Western Europe, Australia, New Zealand, and a few countries in South America. They eat well and their food is of high nutritional quality. The consequence is that they are usually taller and stronger, have abundant energy for work and play, and have a high resistance to disease. They can expect to live a long time.
>
> They are a fortunate few in a predominantly ill-fed world.[14]

The FAO experts consider animal protein intake a reliable guide to the level of nutrition since a high intake of calories derived from animal protein usually means adequate amounts of the other essential vitamins and minerals. With this criterion in mind, it is clear that in much of the Far East, Near East, Latin America and Africa—where most of the human race lives—there are serious protein deficiencies.

In many of these areas, it will be hard to increase the consumption of animal protein. The extension of grazing required in livestock raising disrupts the pattern of crop production in a dense network of small-area subsistence farms. This tends to create unemployment and even greater malnutrition among the farmers.

Such a change would make for a much less efficient conversion of original food calories* into human food.

According to FAO, only about 10 to 15 percent of the calories that could be obtained by growing a grain crop for human consumption would be available if the same grain were fed to cattle to produce beef.

*Original food calories are those that a person would obtain if he ate the grain itself instead of the meat and milk of animals fed the grain.

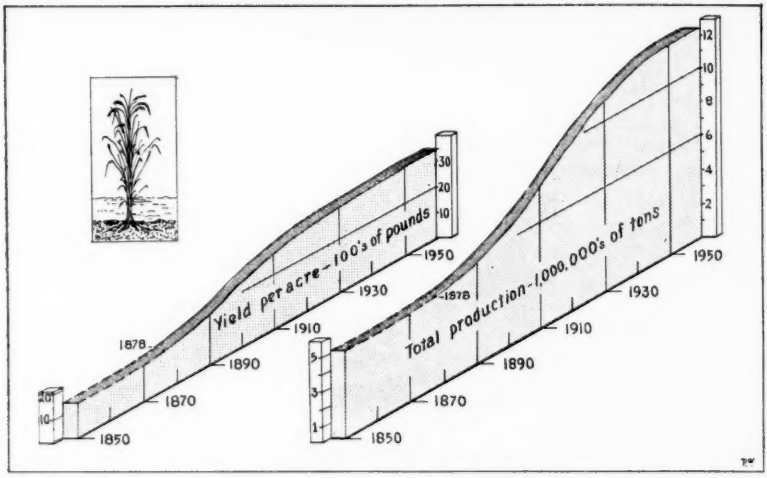

FIGURE 3: RICE PRODUCTION IN JAPAN

The two curves show the increase in yield per acre and in total production of rice in Japan between 1850 and 1950. Both curves have flattened out at somewhere near a maximum under present techniques. In view of the high standards of agricultural research in Japan and the skill of Japanese farmers, this curve emphasizes that agricultural production cannot be expanded indefinitely. Modified after Brown.[2]

Today, when the crying need is for more efficient ways to feed the undernourished peoples, increasing the protein intake by stepped-up livestock production would seem both wasteful of original calories and very expensive.

In some areas, an effort is being made to supply animal protein from other sources. In China and Japan, the culivation of fish in rice paddies for food and as a source of organic fertilizers has been practiced for centuries. In many countries, the production of dairy products, poultry and eggs has increased. In Malaya, Thailand and Indonesia, commercial poultry farming is now practical because Newcastle disease has been controlled.

In terms of the urgency to improve the nutritional standard in the "deficient" countries, progress is at a snail's pace. And the rapidly growing populations are wiping out many of the gains that have been made.

UN WORLD SOCIAL SUMMARY

In 1957, the United Nations published its significant *Report on the World Social Situation* which surveyed postwar progress in solving the world's food problem. Agreeing that a little headway had been made in raising the levels of nutrition in many of the food-deficient countries, the Report pointed to many remaining inequities:

Two main features characterize developments in the world food situation in the last few years. On the one hand there has been an impressive increase in food production in nearly all regions of the world. Not only have the serious food shortages of early post-war years come to an end, but most Governments can now plan ahead without the unremitting pressure of difficulties like inflation, trade gaps, shortages of essential supplies for agricultural development, that so heavily encumbered their efforts in earlier years. On the other hand, there is little indication that some of the longer-term fundamental problems of world food and agriculture have come appreciably nearer to solution. For example, food consumption *per capita* in many less developed countries covering a large part of the world's population still remains below the pre-war level; the wide disparities in consumption (including quality of diet) between the better and the more poorly fed nations noted in the previous report on the world social situation have not noticeably diminished; patterns of food production, though less unbalanced than in earlier years, have become too rigid; and world trade in foodstuffs shows little sign of improvement. The failure of consumption to expand in many parts of the world in the face of larger supplies and increased potentialities for food production is perhaps the most serious feature of this unbalanced situation. This phenomenon finds its most vivid expression in the large food surpluses that have accumulated, chiefly in North America. Even in less developed areas there have been difficulties in recent years in marketing supplies, e.g., rice in the Far East. . . .[21]

Obviously, gains made in food production in postwar years tend to make the food-rich countries richer and the food-poor countries poorer by reason of mounting population. Without mincing words, the United Nations' Report discusses the impact of rapidly grow-

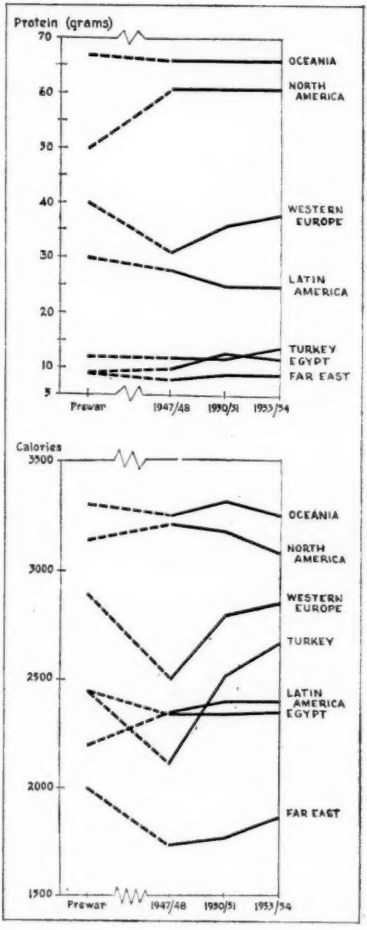

FIGURE 5: DAILY PROTEIN AND CALORIE PER CAPITA INTAKE

These charts show the recent trends in per capita food production in selected countries and regions. In general, areas of population pressure have shown either declines or only slight gains in recent years.[16]

ing population on the food supply in many areas:

Some rough calculations indicate that it will require a dramatic increase in food supplies to feed the population of the world at the current levels of consumption in, say, twenty-five years from now. Supplies of cereals, for instance, would have to be increased by some 300 million tons or 43 per cent and the supplies of protective foods by even higher percentages. Allowance will have to be made, however, for some improvement in food consumption levels. In this case the increase in total food supplies needed will be even greater. Since, moreover, the rate of increase and the magnitude of the deficit differ between one region and another, it is clear that some regions will have to accelerate the rate of increase of their food supplies. For instance, supplies of cereals in the Far East and Near East will have to be increased by about 80 per cent to feed the population at a slightly improved level, while the corresponding figure for Latin America is about 45 per cent.[21]

These trends, which have changed little since the United Nations survey was made, serve as a sober warning of what is in store for the millions of hungry people who live in the countries where population is growing too rapidly. The world may have to take in more than one notch in its belt before it succeeds in the task of improving the food supply on a global scale.

FAO 1958 REPORT

FAO's 1958 Report compared the food situation in the economically underdeveloped areas of the world with that in the more developed areas:

In 1957/58 there was, for the first time, a check in the steady postwar expansion in the world agricultural output. While the immediate cause was unfavorable weather in a number of important producing areas, it is shown that longer-term economic factors were also in large measure responsible. Growing agricultural surpluses, mainly in the more developed countries of the world, have led increasingly to policy measures to restrain further expansion, and for some years these have led to a considerable slowing down of the tempo of agricultural development. By contrast, the rate of agricultural expansion in the less developed countries has generally been well maintained, apart from the vagaries of weather, particularly for the major part of their output which is destined for their own consumption. Production for export has to some extent been affected by the agricultural surpluses in the more industrialized parts of the world. Moreover, real earnings from agricultural exports have been reduced by the downward drift of their prices on world markets, side by side with a continuing rise in prices of manufactured goods.

The paradoxical situation has arisen that in the more developed countries, where supplies are already abundant or overabundant, technical progress has made possible a further rapid expansion of output if markets for larger supplies could be found. On the other hand, in the less developed countries, where demand is increasing rapidly with the fast growth of population and rising standards of living, agricultural expansion is more difficult because of more primitive techniques, lack of investment capital and often unsuitable systems of land tenure and other institutions. The Report suggests that these disparities have often been increased by the agricultural price policies of the two groups of countries.[20]

The situation in the underdeveloped agrarian countries where more than half the earth's people live is somber:

By far the greater part of the agricultural production in the less developed countries, however, is not for export but for consumption within the country, and here the situation is generally very different. At the low income and consump-

tion levels in these countries even small improvements in national incomes resulting from their intensified development programs lead to sharp rises in the per caput demand for agricultural products. These are superimposed upon the rising demand due to their increasingly rapid population growths, as death rates decline with no decline in birth rates. But the often primitive methods of agriculture, the lack of funds to finance more rapid agricultural expansion coupled with recent falls in export prices, the sometimes archaic systems of land tenure, and the inadequate marketing facilities in many of these countries, all make it difficult to step up the flow of supplies to match this two-fold growth of demand. In many cases the consumption level of the farmers themselves is so low that they tend to consume more of their own produce once their immediate need for cash is met, rather than sell it on the market. Moreover, experience has taught the farmer that even in rapidly expanding markets a temporary or local excess of supplies can lead to a heavy fall in prices if there is no effective system of price support or no adequate public storage facilities. All these factors combine to impede an orderly expansion in the supplies marketed to match the rapid growth of demand, and the result is frequent local or national food shortages with rising or sharply fluctuating prices.[20]

TOMORROW'S LARDER

When approaching the difficult problem of an adequately stocked larder for future generations, the most logical first step would seem to be a concerted attack on waste. Colossal quantities of food are lost each year between harvest and the dinner table. Insects, birds, rodents and bacteria consume a lion's share of the food crop. FAO points out that in the United States alone, insects, weeds and plant diseases cost farmers almost $13 billion each year; and that for the world as a whole the quantity of rice and grain destroyed annually by rats and insects probably equals the amount put on the world market. Additional foodstuffs are wasted in some countries as they are processed for market or prepared by housewives for the table.

Other logical steps to be taken involve the intense application of technology to such basic problems as land use, improvement of crops and fertilization practices and increased use of fertilizers; the use of atomic and solar energy in agriculture; more reclamation projects to bring arid lands into cultivation; soil conservation on a global scale; and more efficient harvesting of the sea, a plentiful source of food, to bring its products to the world's dinner tables at a more reasonable cost.

At least in theory, the potentials of the test-tube world are great enough to warrant the most aggressive approach. Research and more research should be pushed to explore all avenues of the food supply problem. Capital outlays will be immense, but further increases in food production will not come cheaply or quickly.

A few years ago, F. G. Walton Smith, Founder and Director of the University of Miami's Marine Laboratory, and Henry Chapin, an historian, co-authored a book which looked into tomorrow's larder. Alarmed by the current population explosion, they reviewed the many steps which should be taken immediately to increase the food supply

To them, the sea holds the most promise:

> In reviewing the world cupboard we have made distinctions between food, energy and mineral or material requirements. We think there can be no argument that essential mineral wealth is in short supply and fast disappearing from the land. The dilute 300 million cubic miles of ocean is an untapped frontier of infinite supply. Energy that we need is fast going with our fossil fuels although on land it may get a far longer, though still temporary, lease of life from atomic energy developments. Our eternal source of energy still remains the sun, mainly through the agency of photosynthesis. And here again the path to plenty leads to the millions of fertile acres of plankton in the seas, which not only serve purpose as sources of future energy but also present a vast renewable expanse of high protein food potential.
>
> . . . only about one-third of the human race has an adequate diet in terms of protein, vitamin and mineral consumption and . . . the other two-thirds is deficient in caloric intake, protective foods, or both. This does not mean that all of this two-thirds of the world is starving to death. It does mean that they are in ill-health and inefficient as human beings compared to the fortunate minority and that the births are balanced by famine, death or substandard living. This area of want is largely in Asia, Africa and South America, where the population increase is greatest. Whether increased agricultural practices can even catch up with this population explosion is an open question. So here again the path to a solution leads to the wealth latent within the fertile seas.[11]

THE COIN HAS TWO SIDES

Food production and human reproduction are the interrelated issues in the problem of world hunger. Both will have to be dealt with simultaneously and with courage. Again, Smith and Chapin:

> Eventually the question of how far we can leave the dangerous and unstable pressure of random population increase to chance will have to be faced the world over. Here again are theological, economic and social considerations that cannot be solved in a test-tube world alone. At present we are manfully striving to breed food and energy fast enough to catch a runaway birthrate, and the prospects for catching up are not bright. Journalists and enthusiasts of various kinds try to say this isn't so. They point to *chlorella*, to superphosphates, to the vast new purchasing power of more and more people on earth. But food and power from costly and nonrenewable sources, we have seen, will not give an answer, nor will a faster and faster consumption of our resources in expanding trade in mechanized gadgetry do anything but hasten the showdown. The equation of supply and use remains. Vegetation used for food in limited acreage leaves so much less for fuel and materials. Oil and coal used for plastics, medicines and building materials have to be deducted from their use for power. Already in the Argentine, the land of beef, the government is giving away free fish to the population because of meat shortages.[11]

Free fish will hardly assuage the world's hunger. Man can begin to assure his children freedom from the misery which population pressure brings after he learns that human reproduction is an integral part of the total food problem, and then acts effectively on this knowledge.

—ROBERT C. COOK, *Editor*

SOURCES

In the preparation of this *Bulletin*, the following sources were consulted. The reader is referred to them for additional information. References to quotations are cited in the text.

1. Braidwood, Robert J. and Reed, Charles A. "The Achievement and Early Consequences of Food Produc-

tion: A Consideration of the Archaeological and Natural-Historical Evidence." *Cold Spring Harbor Symposia on Quantitative Biology*, Vol. XXII—*Population Studies: Animal Ecology and Demography*, Cold Spring Harbor, New York, 1957.

2. Brown, Harrison. *The Challenge of Man's Future.* New York: Viking Press, 1954.
3. Brown, Harrison, Bonner, James and Weir, John. *The Next Hundred Years.* New York: Viking Press, 1957.
4. Carr-Saunders, A. M. *World Population.* Oxford: Clarendon Press, 1936.
5. Cole, La Mont C. "The Ecosphere," *Scientific American*, Vol. 198, No. 4, April, 1958, pp. 83-92.
6. International Labor Office. *Yearbook of Labor Statistics.* Geneva, 1957. pp. 14-51.
7. Keys, Ancel. "Minimum Subsistence" *in* Roy G. Francis (Ed.), *The Population Ahead.* Minneapolis: University of Minnesota Press, 1958.
8. Malthus, T. R. *An Essay on the Principle of Population*, 9th Ed. London: Reeves and Turner, 1888.
9. May, Jacques M. "Human Starvation," *Focus*, Vol. IV, No. 9, May, 1954, pp. 3-4.
10. Meier, Richard L. *Science and Economic Development.* Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, New York, 1956.
11. Smith, F. G. Walton and Chapin, Henry. *The Sun, The Sea and Tomorrow.* New York: Charles Scribners Sons, 1954.

United Nations. Food and Agriculture Organization:

12. FAO and the World Food Problem (pamphlet). Washington, D. C., 1958.
13. Monthly Bulletin of Agricultural Economics and Statistics, Vol. VII, No. 5, May, 1958, p. 25.
14. Second World Food Survey. Rome: November, 1952.
15. Soil Conservation—An International Study. FAO Agricultural Studies No. 4, Washington, 1948.
16. The State of Food and Agriculture —1955. Rome: September 1955.
17. The State of Food and Agriculture —1957. Rome: September 1957.
18. Three Maps on the Distribution of the Population of the World According to Consumption of Calories, Animal Protein and the Main Staple Foods. North American Regional Office, Washington, D. C., 1958.
19. World Food Survey. Washington, D. C., July, 1946.
20. Yearbook of Food and Agricultural Statistics—1957. Part I—Production. Rome, 1958.
21. United Nations. Bureau of Social Affairs. *Report on the World Social Situation.* New York, 1957.
22. United Nations. Department of Economic and Social Affairs. *The Future Growth of World Population.* Population Studies No. 28. New York, 1958.
23. United Nations. Department of Economic Affairs. *Land Reform—Defects in Agrarian Structure as Obstacles to Economic Development.* New York, 1951.

United Nations. Statistical Office:

24. *Demographic Yearbook—1957.* New York, 1957.
25. "Per Capita National Product of Fifty-five Countries—1952-1954." *Statistical Papers.* Series E, No. 4. New York, 1957.
26. "Population and Vital Statistics Report for 1 April 1958." *Statistical Papers.* Series A, Vol. X, No. 2. New York, 1958.
27. United States Department of Agriculture. Commodity Credit Corporation. "Report of Financial Condition and Operations." Washington, D. C., 1958. Schedule 18, pp. 52-53.

(The research report for this *Bulletin* was prepared by Eric Ueland. The *Bulletin* was written by Katherine Glover.)

TABLE II. Indices of Economic Well-Being for Selected Countries.

(1) Country	(2) Per Capita National Product 1952-54 (U. S. Dollars)	(3) Percent Literate of Population 15 yrs. and over (around 1950)	(4) Percent of Economically Active Males not employed in agriculture around 1950	(5) Per Capita Calories 1954-57 (No. per day)	(6) Consumption Animal Protein 1954-57 (gr. per day)
United States	$1,870	97.5	84	3140	66
Canada	1,310	97-98	81	3160	63
Switzerland	1,010	98-99	78	3120	52
New Zealand	1,000	98-99	78	3390	71
Australia	950	98-99	83	3190	56
Sweden	950	98-99	75	3000	52
Luxembourg	890	96-97	78	2980	43
Belgium	800	96.7	86	2980	43
United Kingdom	780	98-99	93	3260	49
Denmark	750	98-99	73	3340	52
France	740	96.4	72	2980	55
Norway	740	98-99	68	3230	53
Finland	670	98-99	53	3200	58
Venezuela	540	52.2	48	------	---
W. Germany	510	98-99	83	2990	43
Netherlands	500	98-99	80	2940	43
Argentina	460	86.4	69	2860	56
Ireland	410	98-99	53	3590	51
Austria	370	98-99	75	2900	42
Italy	310	85-90	66	2560	24
Cuba	310	75-80	43	------	---
Union of S. Africa	300	40-45	81	2640	28
Lebanon	260	45-50	---	------	---
Colombia	250	50-55	34	------	---
Brazil	230	49.4	34	2350*	17*
Greece	220	74.1	47	2580	23
Mexico	220	56.8	39	------	---
Turkey	210	31.9	29	2660	12
Portugal	200	55.9	52	2510	23
Japan	190	97.9	64	2050**	14**
Honduras	150	35.2	---	2250**	10
Egypt	120	19.9	37	2580	13
Peru	120	45-50	32	2070*	---*
Ceylon	110	63.0	43	1890	10***
Pakistan	70	13.5	21	1990**	8***
India	60	19.3	31	1880**	6***

*1951-52 **1954-55 ***1955-56

SOURCES—*Column 2:* United Nations. Statistical Papers "Per Capita National Product of Fifty-five Countries: 1952-1954," Series E, No. 4, 1957. *Column 3:* United Nations. *Report on the World Social Situation*, 1957, pp. 79-86; *Column 4:* International Labor Office, *Yearbook of Labor Statistics. 1957.* Geneva, 1957, pp. 14-51. *Columns 5 and 6:* FAO, *Yearbook of Food and Agricultural Statistics—1957*, Vol. XI, Part 1—*Production*, 1958, p. 234.

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